

METHOD AND APPARATUS FOR COMPLEX DATABASE STRUCTURE

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5 This application claims the benefit of U.S. Provisional Application No. 60/129,574, filed on April 16, 1999, entitled "COMPLEX DATABASE STRUCTURE", which is incorporated herein by reference.

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Technical Field

15 The present invention relates to a relational data structure corresponding to a complex hierarchy relationship. More particularly, the present invention relates to a relational data structure corresponding to elements or database objects to provide defining simultaneous multiple hierarchies and to provide simplified location and access to nodes in a hierarchy.

20 BACKGROUND OF THE INVENTION

 Databases are well-known in the art. Typically, databases store elements or objects that contain data and contain the relationship from one object to another. The database can then be queried by conventional Structured Query Language ("SQL") to extract information including summary
25 information therefrom.

 An example of a database structure is a tree structure, which contains zero or more nodes that are linked together in a hierarchical fashion. The topmost node has been called the root. The root could have zero or more child nodes, connected by edges or links. The root is the parent node to its children.
30 Each child node can in turn have zero or more children of its own. Nodes sharing the same parent are called siblings. Every node in a tree has exactly one parent node (except for the root, which has none), and all nodes in the tree are descendants of the root node. These relationships have set out that there is one and only one path from the root node to any other node in the tree.

There are a number of shortcomings of such database structures. For example, in order to process a summary level information of the data at a lower child level, object A level, such structures must be iteratively processed by summarizing the data from objects in the search path. This iteration for retrieval is inefficient and cumbersome. Further, such structures shown do not allow both single parent and multiple parent hierarchies. In addition, it does not support a graph database structure.

Thus, there is a need to overcome the foregoing difficulties of such database structure.

10 SUMMARY OF THE INVENTION

Provided is a method of creating a relational database having a plurality of objects, each having an associated data is disclosed. A first database table having a plurality of entries, with each entry representing an object with an associated data is formed. A second database table having a plurality of entries, each entry defining a relationship between the plurality of objects is also formed. As another aspect, the present invention relates to an article of manufacture in which a computer usable medium having a computer readable program code embodied therein is configured to cause a computer to execute the foregoing.

20

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a schematic diagram showing a complex tree-like hierarchical database structure to which the present invention can represent.

Figure 2 is a database table showing the relationship of the database objects along with the data stored in the database table.

Figure 3 is a block level diagram of one embodiment of the present invention.

Figure 4 is a schematic diagram of another embodiment of the present invention.

30 DETAILED DESCRIPTION

Referring to Figure 1, there is shown a hierarchical type of database structure. As is shown in Figure 1, object A or database element A has a direct relationship to objects B, C, D. As used hereinafter, elements B, C, D will be

referred to as objects. Object B has objects E and F directly related thereto. Object C is directly related to object G. Object D is directly related to object H. The database structure shown in Figure 1 is typically termed a tree structure and has a hierarchical relationship between objects A, B, C, D, E, F, G and H.

5 Typically, the database structure shown in Figure 1 can represent, for example, sales data. Thus, objects E, F, G and H can represent sales information in a certain locality. Objects B, C and D may be summaries of the sales in a certain region. Object A may then be a summary of a higher order region such as a country.

10 The relationship of the objects A-H in the structure is shown in Figure 2. Each object is represented as a row in a database table 8. In one of the columns, the object is represented by a unique number. Thus, object A is assigned the number 0, object B is assigned the number 1, etc. In another column, the objects to which the particular object in that row has a direct relationship is so
15 indicated. Thus, object A, having the number 0, has a direct relationship with objects B, C and D having the numbers 1, 2 and 3 respectively. Similarly, object B, having the number 1, has a direct relationship with objects E and F with numerical identifiers of 4 and 5 respectively. Similarly, object C, bears a direct relationship to object G having a numerical identifier of 6. Last but not
20 least is object D having a direct relationship with object H having a numerical identifier of 7. In this manner, the relationship of each of the objects to one another is defined in this particular database table. Other columns in each of the rows stores the data associated with that particular object.

Referring to Figure 3 there is shown a schematic diagram of the
25 relationship of the database structure to implement the method and apparatus of the present invention. A first table of members 10 has a plurality of entries. Each entry is defined, e.g. by one row and comprises a database object along with its associated data. The first table 10 has a listing of only of each object and its associated data. Thus, for the hierarchical relationship shown in Figure
30 1, the table 10 contains entries for objects A-H and their associated data.

A second table of reporting relationships 20 is constructed. The second table 20 has a plurality of entries with each entry showing each of the relationships existing in the complex hierarchical structure to which the first table 10 relates. Thus, for example, for the hierarchical structure shown in

Figure 1, there is the following relationship between the various database objects:

	<u>Parent</u>	<u>Child</u>
5	A	A
	A	B
	A	C
	A	D
	A	E
	A	F
10	A	G
	A	H
	B	E
	B	F
	C	G
	D	H
15		

Since there are twelve possible relationships between the database objects of Figure 1, twelve rows or entries are established. Each entry identifies the parent of that relationship and its associated child. Further, each entry indicates whether that relationship is a direct ("0") or indirect ("1") relationship. Thus for the parent-child relationships of A-B, A-C, A-D, these are direct relationships. For the parent child relationships of A-E, A-F, A-G and A-H, these are indirect relationships. Similarly, for the relationships of B-E, B-F, B-G, and B-H, these are direct relationships. In each entry is an indication of the databases structure to which this relationship represents. Thus, for example, the twelve entries relate to the hierarchical structure shown in Figure 1, and has the associated entry of "1" under "Sum Obj". Because the database structure relationship of the present invention can be very flexible, the database objects shown in Figure 1, may be rearranged and have a different relationship. In that event, if, for example, in the second database structural relationship, object E represented by the numerical identifier 4 reports directly to object A, and if it is desired to represent that relationship, in the same table that representation can be set forth with a "Sum Obj" of "2" showing that it represents a different hierarchical structure.

A third table of hierarchy 30 is a summary of all the various possible database structural relationships to which the elements from second table 20 can be summarized. Thus, each row in the third table 30 represents a hierarchy and is a summary of the data in the rows in the second table 20 having rows identified with the identifier "1", in the "Sum Obj" column. An identifier 2 in a row in third table 30 would summarize the relationships from those rows in which there is a column entry labeled "2" for "Sum Obj", and would represent a different hierarchy. Thus, the first row in third table 30 is a summary of the data in which the objects have the relationship shown in Figure 1.

10 The operation of the database structure shown in Figure 3 will now be described. First, given any node in any hierarchy, one can retrieve the nodes that report to that node with a SQL statement and executed with one round trip. Thus, if it is desired, for example, to determine the data summarized into object B at data node identified as 1, one has to do is summarize all the data in which node 1 (object B) is listed as the parent in second table 20, retrieving the identification of the child that reports to that node and summarizing the data from the first table 10.

20 Similarly, to obtain a summary of the data at node 0 or database object A, then the second table 20 is accessed and the entries in which 0 (object A) is the parent are referenced and the data is retrieved from the associated child from the first table 10 and summarize those. Therefore, retrieval of a node of the objects that report to it can be achieved by a SQL statement providing expeditious searches.

25 Second, an advantage of the present invention is that it allows definition of simultaneous multiple hierarchies on the database tables without having to use dedicated database relations for any of the hierarchies. As previously discussed, it is possible, for example, for the database objects shown in Figure 1 to have the relationship shown in Figure 1. It is also possible for those same database objects to have a different relationship in which object E reports directly to object A. This example is shown in Figure 3 wherein the same database objects in first database table 10 are shown in hierarchical relationship of 1 (under the "Sum Obj" column) and also the same relationship is established with a second hierarchical structure in which a 2 appears in the "Sum Obj" column. Thus, without the need to use dedicated database relationships for any

of the hierarchies, one can establish simultaneous multiple hierarchies on the same database objects.

Third, with the present invention where the relationship is separate and apart from the underlying data, single parent and multiple parent hierarchies can also be defined. Figure 1 shows a structural relationship of a single parent hierarchy. A multiple parent hierarchy would be, for example, with the structural relationship of Figure 1 inverted in which objects E, F, G and H are the parents and the childs are B, C, D and A. Database object B would have multiple parents reporting to both database object E and database object F. Establishing such a relationship in the database structural relationship of the present invention is simply a matter of defining the appropriate database object under the column of parent and the appropriate database object under the column of child. Such a structure would support both tree and graph type structures.

From the foregoing, it can be seen that with the relationship defined separately from the underlying data, and with the definition of each parent and child, execution of retrieval of information from the database structure is extremely efficient and fast. Moreover, for example, if the hierarchy is to change, the definition change reformats the hierarchy by modifying the second table 20, accordingly. In contrast, in the database table 8, one must change the database table in which the data is also present. In the present invention, where the data is separate from the relationship, data integrity during maintenance can be preserved. Further, the functions of data entry and data maintenance can be separated.

Referring to Figure 4 there is shown yet another embodiment of the present invention. As before, a first table 10 stores each of the database objects and their associated data. A second table 20 stores each of the relationships in a parent-child definition for the hierarchy to which the database objects stored in first table 10 represents. As previously discussed, second table 20 may store relationships representing more than one complex hierarchy relationship to which the database objects of first table 10 represent. Similar to Figure 3, each row of a third table 30 represents a different complex hierarchy structure to which the database objects stored in the first table 10 represent.

The difference between the database structure relationship shown in Figure 4 and that shown in Figure 3 is that there is an intermediate fourth table 40 between the second table 20 and the third table 30. Each row in the fourth table 40 relates to a row in the third table 30 to a row in the second table 20.

- 5 For example, in accounting, this may be termed a sub-total. Thus, for example, each row in the fourth table ("a Sub-Total") 40 may relate a row in third table 30 ("a Grand Summary") to the rows in the second table 20.

In the preferred embodiment the method of the present invention is practiced by a computer operating a computer readable program stored on a computer usable medium, such as a disc drive. The pertinent portion of the method of the present invention can be practiced by the following code, written in Clarify® Basic, a language that can be executed under any of the following operating systems: Microsoft NT, Sun Solaris, HP Unix, and AIX (IBM). The relevant objects are table_rollup (one row for the hierarchy description), table_loc_rol_itm (all the "reports to" parent child rows), and table_inv_locatn (the objects being rolled up into this particular hierarchy). As an example, note the database relation from rollup to table_cycle_count. This allows a particular inventory cycle count to be tied to a particular rollup of inventory locations.

```

20 Option Explicit

    '
    *****
25    '
    ' 8431.cbp
    '
    ' CB code for Inventory Count Location window
    '
30    '
    *****
    #DECLARESTRINGS lcb
    #DECLARESTRINGS oab
    #INCLUDE LE.cbh
35    #INCLUDE cbconst.cbh
    #INCLUDE utils.cbh
    #INCLUDE CL.cbh

    Declare Function LEIsAChild( le As LEType ) As Boolean
40    Declare Sub lcbGetRollup()
    Declare Sub lcb_AddRolItm ( newParentRec As Record, newChildRec
    As Record, rollupRec As Record, parentDepth as Long )
    Declare Function lcb_MeetAllRollupConditions ( rollupView As
    String, newParentRec As Record, newChildRec As Record, rollupRec
45    As Record ) As Boolean

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Declare Sub lcb_Delete_obj_rol_itm ( newChildRec As Record,
rollupRec As Record)
Declare Sub lcb_GetDataToValidateAdd ( viewName As String,
currParent As Record, currChild As Record, rollupRec As Record )
5 Declare Sub lcb_ValidateParent ( currParent As Record, rollupRec
As Record, currParentLocRec As Record )
Declare Function lcb_IsItself ( newParentRec As Record,
newChildRec As Record ) As Boolean
Declare Function lcb_IsParent ( pList As List, newParentRec As
10 Record ) As Boolean
Declare Function lcb_IsChild ( cList As List, newChildRec As
Record ) As Boolean
Declare Function lcb_InOtherInventoryRollup (newChildRec As
Record, rollupRec As Record) As Boolean
15 Declare Function lcb_IsSomeWhereInRollup ( newChildRec As Record
) As Boolean

global const RECORD_TYPE = "rollup"

20 ' Form specific constants

global gchildCList           As List           ' new child's
children list
global gchildPList           As List           ' new child's parent
25 list
global gparentCList          As List           ' new parent's
children list
global gparentPList          As List           ' new parent's parent
list
30
Dim childCList               As List           ' new child's
children list
Dim childPList               As List           ' new child's parent
list
35 Dim parentCList            As List           ' new parent's
children list
Dim parentPList              As List           ' new parent's parent
list
40 Dim otherInvRollupParentList As List           ' check for new child
loc in other Inv rollup list
Dim otherInvRollupChildList  As List           ' check for new child
loc in other Inv rollup list
Dim invRollupList            As List           ' current rollup list
45
Dim nodeKeyRemoved           As Long           'Store the node key
that was removed
Dim nodeDepthRemoved         As Long           'Store the node depth
that was removed
50
Dim nodX                     as Long
Dim imageVal                 as Long
Dim selectedImageVal          as Long

55 const tvwFirst      = 0   'First Sibling.
const tvwLast        = 1   'Last Sibling.
const tvwNext         = 2   'Next sibling.
const tvwPrevious     = 3   'Previous sibling.
const tvwChild        = 4   'Child.

60 ' -----

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    btnReplace.default = btnReplace.Enabled
    btnRemoveRollup.Enabled = btnReplace.Enabled

    btnAddParent.Enabled = clbCbxCntLocs.SelCount = 1 and
5  nodeLocationRec.GetField("loc_objid") = 0
    btnAddChild.Enabled = clbCbxCntLocs.SelCount > 0 and
    nodeLocationRec.GetField("loc_objid") <> 0
    btnAddSibling.Enabled = clbCbxCntLocs.SelCount > 0 and
    nodeLocationRec.GetField("loc_objid") <> 0
10  btnRemove.Enabled = nodeLocationRec.GetField("loc_objid") <>
    0

    If rollupRec.GetField("objid") = 0 Then
        Me.DisableControls "PBEFCbxeCountLoc", "btnCbxfCountLoc"
15  Else
        Me.EnableControls "PBEFCbxeCountLoc", "btnCbxfCountLoc"
    End If

    If nodeLocationRec.GetField("loc_objid") <> 0 Then
20  Me.DisableControls "ddlRollupType"
    Else
        Me.EnableControls "ddlRollupType"
    End If

25  End Sub

' -----
' Adhoc handler for Rollups
' -----
30

Sub HandleAdhocRollup()

    CBX_SelectLocRollup.ClearPreFilter "object_type", ""
    CBX_SelectLocRollup.AppendPreFilter "object_type",
35  "focus_type", "is equal to", 228

End Sub

' -----
40  ' Adhoc handler for Locations
' -----

Sub HandleAdhocLocation()

45  CBX_SelectCountLocs.ClearPreFilter "CountLoc_loc_name", ""
    CBX_SelectCountLocs.ClearPreFilter "CountLoc_loc_type", ""

    CBX_SelectCountLocs.ClearPreFilter "",
    "locatn2inv_role:role_name"
50  CBX_SelectCountLocs.AppendPreFilter "",
    "locatn2inv_role:role_name", "is equal to", LCB_LOCATED_AT_ROLE
    CBX_SelectCountLocs.ClearPreFilter "class", "inv_class"
    CBX_SelectCountLocs.AppendPreFilter "class", "inv_class", "is
55  equal to", 0

End Sub

' -----
' Clear all related data
' -----
60

Sub ClearRelatedRollup()

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```

        Call HandleAdhocLocation
        CBX_SelectCountLocs.Regenerate
        Call ProperEnabling
End Sub
5
' -----
' Rollup Lookup button is clicked
' -----

10 Sub PBEFCbxRollup_Click()

    'Need to clear the currently selected rollup's treeview
    tvwCountLoc.Clear
    Call ClearRelatedCountLoc
15    Call ClearCobj( Cobj_recSelectLocBinNode, "locatn_view" )
    Call ClearRelatedRollup

    'Need to add application required prefilters
    Call HandleAdhocRollup
20

    'Now let the CBX do the rest of the filtering
    Me.DoDefault

    Call ProperEnabling
25
End Sub

' -----
' Location Lookup button is clicked
' -----
30

Sub PBEFCbxCountLoc_Click()

    'Need to add application required prefilters
35    Call HandleAdhocLocation

    'Now let the CBX do the rest of the filtering
    Me.DoDefault
End Sub
40

' -----
' When New is clicked, post the New Account and Location Window
' -----

45 Sub btnAddNew_Click()
    Dim mystr_new as string
    App.GetString OAB_GSL_CASE_STS_NEW, mystr_new
    App.ExecuteMenu mystr_new, LCB_ACCT_LOC_MENU_OPTION
End Sub
50

' -----
' When a Rollup Row is clicked, show data and sync with detail
form
' -----

55 Sub clbCbxLocRollups_Click()
    Dim le As LType
    Call FillLE( le )
    Call LEListClbClick( le )

60    tvwCountLoc.Clear
    Call ClearRelatedCountLoc

```

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        Call ClearCobj( Cobj_recSelectLocBinNode, "locatn_view" )
        Call lcbGetRollup ( )
        Call ProperEnabling
    End Sub
5
    ' -----
    ' When a Location Row is clicked, show data and sync with detail
    ' form
    ' -----
10
    Sub clbCbxCOUNTLocs_Click()
        Call ClickOTM ( Cobj_recLocatnView, clbCbxCOUNTLocs )
        Call ProperEnabling
    End Sub
15
    ' -----
    ' Node Events
    ' -----

20    Sub tvwCOUNTLoc_Collapse(nodeID as Long)
    End Sub

    Sub tvwCOUNTLoc_Expand(nodeID as Long)
    End Sub
25
    Sub tvwCOUNTLoc_NodeClick(nodeID as Long )

        Dim locBinNodeRec  as New Record

30        Set locBinNodeRec.RecordType = "locatn_view"

        locBinNodeRec.SetField "loc_objid",
        CLng(tvwCOUNTLoc.Key(nodeID))
        Cobj_recSelectLocBinNode.Fill locBinNodeRec
35        Call ProperEnabling

    End Sub

40    ' -----
    ' Click Remove button
    ' -----
    Sub btnRemove_Click()

45        Dim newChildRec      As New Record
        Dim locationBulkR     As New BulkRetrieve
        Dim rollupRec         As Record
        Dim nodeLocationRec   As Record

50        newChildRec.RecordType = "inv_locatn"

        Set rollupRec = Cobj_recLocRollup.Contents

        If rollupRec.GetField("use_type") = 0 Then 'CC count point
55            If lcbActiveCCExists(rollupRec, "rollup2cycle_count") Then
                App.MsgBox LCB_CC_ROLLUP_ERR2
                Exit Sub
            End If
        End If
60        Set nodeLocationRec = Cobj_recSelectLocBinNode.Contents

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    newChildRec.SetField "objid",
nodeLocationRec.GetField("loc_objid")

5    nodeKeyRemoved = nodeLocationRec.GetField("loc_objid")

    ' delete all children role from the parent
    Call lcb_Delete_obj_rol_itm ( newChildRec, rollupRec )

10    tvwCountLoc.Clear
    Call lcbGetRollup ()
    Call ProperEnabling

End Sub

15    ' -----
    ' Click ADD rollup button
    ' -----
Sub btnAdd_Click()
20    Dim le As LEType
    Call FillLE(le)
    Call LEListAdd( le )
    Call ProperEnabling
End Sub

25    ' -----
    ' Click SAVE rollup button
    ' -----
Sub btnReplace_Click()
30    Dim le As LEType
    Call FillLE(le)
    Call LEListReplace( le )
    Call ProperEnabling
End Sub

35    ' -----
    ' Click REMOVE rollup button
    ' -----
Sub btnRemoveRollup_Click()
40    Dim locationBulkR      As New BulkRetrieve
    Dim rollupRec           As Record
    Dim MyBulkSav           As New BulkSave
    Dim rollupList          As List
    Dim rollupItmRec        As Record
45    Dim index              As Long
    Dim dbString            As String

    Dim le As LEType
    Call FillLE(le)

50    Set rollupRec = Cobj_recLocRollup.Contents

    If rollupRec.GetField("use_type") = 0 Then 'CC count point
        If lcbCCExists(rollupRec, "rollup2cycle_count") Then
55            App.MsgBox LCB_CC_ROLLUP_ERR1
            Exit Sub
        End If
    End If

60    locationBulkR.SetRoot rollupRec
    locationBulkR.TraverseFromRoot 0, "rollup2loc_rol_itm"

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```

locationBulkR.RetrieveRecords

Set rollupList = locationBulkR.GetRecordList(0)

5   If rollupList.Count > 0 Then
      If App.MsgBox( LCB_ROLLUP_DELETE_VALID_MSG, cbYesNo,
LE_CONFIRM_DELETE_DLG_TITLE ) = cbidNo Then
          Exit Sub
      End If
10  End If

      ' Actually delete it

      If rollupList.Count > 0 Then
15      For index = 0 To rollupList.Count - 1
          Set rollupItmRec = rollupList.ItemByIndex(index)
          MyBulkSav.DeleteRecord rollupItmRec
      Next index
      End If
20  MyBulkSav.DeleteRecord rollupRec
      MyBulkSav.Save

      ' Tell any parent screen to delete the row

25  If LEIsAChild( le ) Then
      le.frm.NotifyParent msgLEListDelete
      Else
          Call LEEditNew( le )
      End If
30

      ' No need to save changes now

      Call LEClearDirty ( le )

35  ' Remove the deleted item from the grid

      clbCbxLocRollups.RemoveSelected
      clbCbxLocRollups.Unselect

40  tvwCountLoc.Clear
      Call ClearRelatedCountLoc
      Call ClearCobj( Cobj_recSelectLocBinNode, "locatn_view" )

      Call ProperEnabling
45  End Sub

Sub SaveOther( le As LEType )

50  If ZeroObjid( Cobj_recLocRollup.Contents ) Then
      grec_le.SetField "rollup_type", 1
      grec_le.SetField "focus_type", 228
      End If

55  End Sub

      ' -----
      ' Add As Parent button is clicked
      ' -----

60  Sub btnAddParent_Click()

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```

Dim parentRec As Record
Dim rollupRec As Record

Set parentRec = Cobj_recLocatnView.Contents
5 Set rollupRec = Cobj_recLocRollup.Contents

If rollupRec.GetField("use_type") = 0 Then 'CC count point
    If lcbActiveCCEExists(rollupRec, "rollup2cycle_count") Then
        App.MsgBox LCB_CC_ROLLUP_ERR2
10 Exit Sub
    End If
End If

If rollupRec.GetField("use_type") = 0 Then
15 Dim parentLocRec As New Record

    Set parentLocRec.RecordType = "inv_locatn"
    parentLocRec.SetField "objid",
parentRec.GetField("loc_objid")
20 Call lcb_ValidateParent ( parentRec, rollupRec,
parentLocRec )

    If lcb_InOtherInventoryRollup (parentLocRec, rollupRec)
25 Then
        Exit Sub
    End If
End If

30 nodX = tvwCountLoc.Add( ,
,CStr(parentRec.GetField("loc_objid"))
,parentRec.GetField("location_name") ,imageVal,
selectedImageVal)
    If parentRec.GetField("active") = 0 Then
35 tvwCountLoc.SetItemOverlayImage nodX,1
    End If

Dim Bulks As New BulkSave
Dim newRoleRec As New Record
40 newRoleRec.RecordType = "loc_rol_itm"
newRoleRec.SetField "path_type", 0
newRoleRec.SetField "depth", 0
Bulks.InsertRecord newRoleRec
Bulks.RelateRecordsToID newRoleRec, "inv_locatn",
45 parentRec.GetField("loc_objid"), "parent2inv_locatn"
Bulks.RelateRecordsToID newRoleRec, "inv_locatn",
parentRec.GetField("loc_objid"), "child2inv_locatn"
Bulks.RelateRecords newRoleRec, rollupRec,
"loc_itm2rollup"
50 Bulks.Save

Dim locBinNodeRec as New Record
Set locBinNodeRec.RecordType = "locatn_view"
Set locBinNodeRec = parentRec.Copy
55 Cobj_recSelectLocBinNode.Fill locBinNodeRec

'need a method to set selected node!!!!
    tvwCountLoc.SetSelectedItem
CStr(parentRec.GetField("loc_objid"))
60 Call ProperEnabling

```

```

End Sub

' -----
5 ' Add As Sibling button is clicked
' -----

Sub btnAddSibling_Click()

'Get the selected node record from database and the Selected
10 Build Hierarchy location(s)
    Dim nodeLocationRec      as Record
    Dim locBuildList         as List
    Dim locBuildObjidList    as New List
    Dim nodeLocList         as List
15    Dim nodeLocRec          as Record
    Dim rollupRec            as Record
    Dim locBuildRec          as Record
    Dim locIndex             as Long
    Dim locationBulkR        as New BulkRetrieve
20    Dim parentDepth        As Long
    Dim nodeRolList          As List
    Dim nodeRolRec           As Record
    Dim parentOfNodeLocRec   As New Record

25    Set nodeLocationRec = Cobj_recSelectLocBinNode.Contents
    Set rollupRec = Cobj_recLocRollup.Contents

    If rollupRec.GetField("use_type") = 0 Then 'CC count point
        If lcbActiveCCExists(rollupRec, "rollup2cycle_count") Then
30            App.MsgBox LCB_CC_ROLLUP_ERR2
            Exit Sub
        End If
    End If

35    locBuildObjidList.ItemType = "long"
    Set locBuildList = clbCbxCntLocs.SelectedList
    locBuildList.ExtractList locBuildObjidList, "loc_objid"

    locationBulkR.SimpleQuery 0, "inv_locatn"
40    locationBulkR.AppendFilter 0, "objid", cbEqual,
nodeLocationRec.GetField("loc_objid")
    locationBulkR.SimpleQuery 1, "inv_locatn"
    locationBulkR.AppendFilter 1, "objid", cbIn,
locBuildObjidList
45    locationBulkR.SimpleQuery 2, "loc_rollup_v"
    locationBulkR.AppendFilter 2, "child_objid", cbEqual,
nodeLocationRec.GetField("loc_objid")
    locationBulkR.AppendFilter 2, "path_type", cbEqual, 0
    locationBulkR.AppendFilter 2, "rollup_objid", cbEqual,
50    rollupRec.GetField( "objid" )

    locationBulkR.RetrieveRecords
    Set nodeLocList = locationBulkR.GetRecordList(0)
    Set locBuildList = locationBulkR.GetRecordList(1)
55    Set nodeRolList = locationBulkR.GetRecordList(2)

    'If nodeRolList.Count = 1 Then
        Set nodeRolRec = nodeRolList.ItemByIndex(0)
        ' If nodeRolRec.GetField("depth") > 0 Then
60         parentDepth = nodeRolRec.GetField("depth") - 1
        ' Else

```

```

'      App.MsgBox LCB_PARENT_ERR_BUILD_HIER
'      Exit Sub
'      End If
' Else
5      App.MsgBox LCB_PARENT_ERR_BUILD_HIER
'      Exit Sub
'      End If
    If nodeRolList.Count > 0 Then
        Set nodeRolRec = nodeRolList.ItemByIndex(0)
10        If nodeRolRec.GetField("depth") > 0 Then
            parentDepth = nodeRolRec.GetField("depth") - 1
        Else
            App.MsgBox LCB_PARENT_ERR_BUILD_HIER
            Exit Sub
15        End If
    Else
        App.MsgBox LCB_PARENT_ERR_BUILD_HIER
        Exit Sub
    End If
20
'Update the new child to have the same parent as selected node
    If nodeLocList.Count = 1 Then
        Set nodeLocRec = nodeLocList.ItemByIndex(0)
        Set parentOfNodeLocRec.RecordType = "inv_locatn"
25        parentOfNodeLocRec.SetField "objid",
nodeRolRec.GetField("parent_objid")

        For locIndex = 0 to locBuildList.Count - 1
            Set locBuildRec = locBuildList.ItemByIndex(locIndex)
30
            ' check if meet all other conditions
            If lcb_MeetAllRollupConditions ( "loc_rollup_v",
parentOfNodeLocRec, locBuildRec, rollupRec ) Then

35                ' Create a direct child loc_rol_itm and copy all
children as indirect children to the parents
                Call lcb_AddRolItm ( parentOfNodeLocRec,
locBuildRec, rollupRec, parentDepth )

40                nodX =
tvwCountLoc.Add(CStr(nodeRolRec.GetField("parent_objid")),tvwChi
ld, CStr(locBuildRec.GetField("objid")),
locBuildRec.GetField("location_name"),imageVal,selectedImageVal)
                If locBuildRec.GetField("active") = 0 Then
45                    tvwCountLoc.SetItemOverlayImage nodX,1
                End If

            End If
        Next locIndex
50
        Call ProperEnabling
    End If

End Sub
55

' -----
' Add As Child button is clicked
' -----
60
Sub btnAddChild_Click()

```

```

'Get the selected node record from database and the Selected
Build Hierarchy location(s)
5   Dim nodeLocationRec      as Record
    Dim locBuildList        as List
    Dim locBuildObjidList    as New List
    Dim nodeLocList         as List
    Dim nodeLocRec          as Record
    Dim rollupRec           as Record
10   Dim locBuildRec         as Record
    Dim locIndex            as Long
    Dim locationBulkR        as New BulkRetrieve
    Dim parentDepth         As Long
    Dim nodeRolList         As List
15   Dim nodeRolRec         As Record

    Set nodeLocationRec = Cobj_recSelectLocBinNode.Contents
    Set rollupRec = Cobj_recLocRollup.Contents

20   If rollupRec.GetField("use_type") = 0 Then 'CC count point
        If lcbActiveCCExists(rollupRec, "rollup2cycle_count") Then
            App.MsgBox LCB_CC_ROLLUP_ERR2
            Exit Sub
        End If
25   End If

    locBuildObjidList.ItemType = "long"
    Set locBuildList = clbCbxCntLocs.SelectedList
    locBuildList.ExtractList locBuildObjidList, "loc_objid"
30

    locationBulkR.SimpleQuery 0, "inv_locatn"
    locationBulkR.AppendFilter 0, "objid", cbEqual,
nodeLocationRec.GetField("loc_objid")
    locationBulkR.SimpleQuery 1, "inv_locatn"
35   locationBulkR.AppendFilter 1, "objid", cbIn,
locBuildObjidList
    locationBulkR.SimpleQuery 2, "loc_rollup_v"
    locationBulkR.AppendFilter 2, "child_objid", cbEqual,
nodeLocationRec.GetField("loc_objid")
40   locationBulkR.AppendFilter 2, "path_type", cbEqual, 0
    locationBulkR.AppendFilter 2, "rollup_objid", cbEqual,
rollupRec.GetField( "objid" )

    locationBulkR.RetrieveRecords
45   Set nodeLocList = locationBulkR.GetRecordList(0)
    Set locBuildList = locationBulkR.GetRecordList(1)
    Set nodeRolList = locationBulkR.GetRecordList(2)

    If nodeRolList.Count = 1 Then
50       Set nodeRolRec = nodeRolList.ItemByIndex(0)
        parentDepth = nodeRolRec.GetField("depth")
    Else
        parentDepth = 0
    End If
55   End If

'Update the child to have the same parent
    If nodeLocList.Count = 1 Then
        Set nodeLocRec = nodeLocList.ItemByIndex(0)
        For locIndex = 0 to locBuildList.Count - 1
60           Set locBuildRec = locBuildList.ItemByIndex(locIndex)

```

```

        ' check if meet all other conditions
        If lcb_MeetAllRollupConditions ( "loc_rollup_v",
nodeLocRec, locBuildRec, rollupRec ) Then

5           ' Create a direct child loc_rol_itm and copy all
children as indirect children to the parents
            Call lcb_AddRolItm ( nodeLocRec, locBuildRec,
rollupRec, parentDepth )

10          nodX =
tvwCountLoc.Add(CStr(nodeLocRec.GetField("objid")),tvwChild,
CStr(locBuildRec.GetField("objid")),
locBuildRec.GetField("location_name"),imageVal,selectedImageVal)
            If locBuildRec.GetField("active") = 0 Then
15                tvwCountLoc.SetItemOverlayImage nodX,1
            End If

            End If

20          Next locIndex

            Call ProperEnabling
            End If

25 End Sub

' -----
' New button is clicked - Clear button
' -----
30

Sub btnNew_Click()
    tvwCountLoc.Clear
    Call ClearRelatedCountLoc
    Call ClearRelatedRollup
35    Call ClearCobj( Cobj_recSelectLocBinNode, "locatn_view" )
    Call ProperEnabling
End Sub

40 Sub btnUseDone_Click()
    Set grec_le = Cobj_recLocRollup.Contents
    Me.NotifyParent msgLEListMoveRecord, "rollup"
    Me.Close
End Sub

45

' -----
' Show a single related record
' -----

50 Sub MoveRecord( MessageStr As String )
End Sub

' -----
55 ' Message handler
' -----

Sub Message (ByVal MessageNum as Long, ByVal MessageStr as
String)
60    Dim le As LEType

```

```

Call FillLE(le)

Select Case MessageNum

5      Case msgLEListCheckRequired
        Call CheckRequired

        Case msgLEEditMakeChild
          Call LESetIsAChild( le, True )

10     Case msgLEListSaveOther
        Call SaveOther ( le )

        Case msgLEListPreFilter
15     Select Case MessageStr
        Case "rollup"
          CBX_SelectLocRollup.ClearPreFilter "objid", ""
          CBX_SelectLocRollup.AppendPreFilter
20     "", "objid", "is equal to", grec_le.GetField("objid")
          btnCbxfRollup.Enabled = TRUE
          btnCbxfRollup.Value = 1
          'Me.EnableControls "btnUseDone"
          'btnUseDone.Default = TRUE
          CBX_SelectLocRollup.SetSelectedById
25     grec_le.GetField("objid")

          Dim locRollupRec As New Record
          If
30     CBX_SelectLocRollup.GetSelected(locRollupRec) Then
            Cobj_recLocRollup.Fill locRollupRec
            tvwCountLoc.Clear
            Call ClearRelatedCountLoc
            Call ClearCobj( Cobj_recSelectLocBinNode,
35     "locatn_view" )
            Call lcbGetRollup ()
            Call ProperEnabling
            End If

            Case "inv_locatn"
40     Dim recInvLocatn as Record
            Set recInvLocatn = grec_le
            If recInvLocatn.GetField("location_name") <>
"" Then
              CBX_SelectLocRollup.ClearPreFilter "",
45     "rollup2loc_rol_itm:child2inv_locatn:location_name"
              CBX_SelectLocRollup.AppendPreFilter "",
"rollup2loc_rol_itm:child2inv_locatn:location_name", "is equal
to", recInvLocatn.GetField("location_name")
              End If
50     btnCbxfRollup.Value = 1
            Me.EnableControls "btnUseDone"
            btnUseDone.Default = TRUE

            Case "cycle_setup"
55     Dim recCCRollup as Record
            Set recCCRollup = grec_le
            CBX_SelectLocRollup.ClearPreFilter
"usage_type", ""
            CBX_SelectLocRollup.AppendPreFilter
60     "usage_type", "use_type", "is equal to", 0
            If recCCRollup.GetField("name") <> "" Then

```

```

                                CBX_SelectLocRollup.EnableAdhoc TRUE, TRUE
                                CBX_SelectLocRollup.SetAdhocCellText
" name", recCCRollup.GetField("name")
                                End If
5                                btnCbxfRollup.Value = 1
                                Me.EnableControls "btnUseDone"
                                btnUseDone.Default = TRUE

                                Case "count_setup"
10                                CBX_SelectLocRollup.ClearPreFilter
"usage_type", ""
                                CBX_SelectLocRollup.AppendPreFilter
"usage_type", "use_type", "is equal to", 0
                                btnCbxfRollup.Value = 1
15                                Me.EnableControls "btnUseDone"
                                btnUseDone.Default = TRUE

                                End Select

20                                Case msgLEEditMoveRecord
                                    Call MoveRecord( MessageStr )

                                Case Else
                                    If Not LEListMsgHandler( MessageNum, MessageStr, le )
25                                Then Call ASSERT( False, BadMsgMsg( Me.ID, MessageNum ) )
                                    End Select

                                End Sub

30                                ' *****
                                ' Functions and Routines
                                ' *****

35                                ' -----
                                ' Display the location hierarchy for the selected rollup
                                ' -----

                                Sub lcbGetRollup()
                                    Dim BulkR                                As New BulkRetrieve
40                                    Dim rollupLocList                    As List
                                    Dim childLocRec                        As Record
                                    Dim childLocationIndex                As Long
                                    Dim locBinNodeRec as New Record

45                                    Set locBinNodeRec.RecordType = "locatn_view"

                                    BulkR.SimpleQuery 0, "loc_rollup_v"
                                    BulkR.AppendFilter 0, "rollup_objid", cbEqual, CGetField (
Cobj_recLocRollup, "objid" )
50                                    BulkR.AppendFilter 0, "path_type", cbEqual, 0
                                    BulkR.AppendSort 0, "depth", cbAscending
                                    BulkR.RetrieveRecords

                                    Set rollupLocList = BulkR.GetRecordList(0)
55                                    If rollupLocList.Count > 0 Then
                                        For childLocationIndex = 0 to rollupLoclist.Count - 1

                                            Set childLocRec =
rollupLoclist.ItemByIndex(childLocationIndex)
60                                            If childLocationIndex = 0 Then

```

```

        nodX = tvwCountLoc.Add( ,
, CStr(childLocRec.GetField("parent_objid"))
, childLocRec.GetField("parent_name") , imageVal,
selectedImageVal)
5      If childLocRec.GetField("parent_active") = 0 Then
        tvwCountLoc.SetItemOverlayImage nodX,1
      End If

      'Set the parent node as the selected node. Need this
10    to enable/disable controls.
        locBinNodeRec.SetField "loc_objid",
childLocRec.GetField("parent_objid")
        Cobj_recSelectLocBinNode.Fill locBinNodeRec
      'set selected node
15      tvwCountLoc.SetSelectedItem
CStr(childLocRec.GetField("parent_objid"))

      Else
        nodX =
20      tvwCountLoc.Add(CStr(childLocRec.GetField("parent_objid")), tvwCh
ild, CStr(childLocRec.GetField("child_objid")),
childLocRec.GetField("child_name"), imageVal, selectedImageVal)
        If childLocRec.GetField("child_active") = 0 Then
          tvwCountLoc.SetItemOverlayImage nodX,1
25        End If

        If childLocRec.GetField("depth") <= nodeDepthRemoved
Then
          tvwCountLoc.Expand
30        CStr(childLocRec.GetField("parent_objid")), 2
        End If
      End If
    Next
  Else
35    Cobj_recSelectLocBinNode.Fill locBinNodeRec
  End If

  nodeKeyRemoved = 0
  nodeDepthRemoved = 0
40
End Sub

Sub lcb_Delete_obj_rol_itm ( newChildRec As Record, rollupRec As
Record)
45  Dim MyBulkR              As New BulkRetrieve
  Dim MyBulkSav             As New BulkSave
  Dim nodeCList             As List
  Dim rolItmObjidList       As New List
  Dim childLocObjidList     As New List
50  Dim rolItemRec           As Record
  Dim deleteList            As List
  Dim index                 As Long

  childLocObjidList.ItemType = "long"
55  childLocObjidList.AllowDuplicates = FALSE

  'Get the selected nodes children
  MyBulkR.SimpleQuery 0, "loc_rollup_v"
  MyBulkR.AppendFilter 0, "parent_objid", cbEqual,
60  newChildRec.GetField( "objid" )

```



```

    MyBulkR.AppendFilter 0, "rollup_objid", cbEqual,
rollupRec.GetField( "objid" )
    MyBulkR.RetrieveRecords

5    Set nodeCList = MyBulkR.GetRecordList(0)
    If nodeCList.Count > 0 Then
        nodeCList.ExtractList childLocObjidList, "child_objid"
    End If

10    'Include the selected node in the list to delete
        childLocObjidList.AppendItem newChildRec.GetField( "objid" )

    'Now retrieve the children's children
        MyBulkR.SimpleQuery 0, "loc_rollup_v"
15    MyBulkR.AppendFilter 0, "child_objid", cbIn,
childLocObjidList
        MyBulkR.AppendFilter 0, "rollup_objid", cbEqual,
rollupRec.GetField( "objid" )
        MyBulkR.RetrieveRecords

20    Set deleteList = MyBulkR.GetRecordList(0)
    If deleteList.Count > 0 Then
        rolItmObjidList.ItemType = "long"
        deleteList.ExtractList rolItmObjidList, "objid"

25    'Get the removed node record to get its depth so that
the Tree can be
        'Expanded out to this depth when it is refreshed
        Dim removedNodeLocRec as Record
30    For index = 0 to deleteList.Count - 1
        Set removedNodeLocRec =
deleteList.ItemByIndex(index)
        If CLng(removedNodeLocRec.GetField("child_objid")) =
nodeKeyRemoved AND CLng(removedNodeLocRec.GetField("path_type"))
35    = 0 Then
            nodeDepthRemoved =
CLng(removedNodeLocRec.GetField("depth"))
            Exit For
        End If
40    Next

        MyBulkR.SetRoot rollupRec
        MyBulkR.TraverseFromRoot 0, "rollup2loc_rol_itm"
        MyBulkR.AppendFilter 0, "objid", cbIn, rolItmObjidList

45    MyBulkR.RetrieveRecords

        Set deleteList = MyBulkR.GetRecordList(0)
        For index = 0 to deleteList.Count - 1
50    Set rolItemRec = deleteList.ItemByIndex(index)
        MyBulkSav.DeleteRecord rolItemRec
        Next index
        MyBulkSav.Save
        End If

55    End Sub

Function lcb_IsItself ( newParentRec As Record, newChildRec As
Record ) As Boolean

60    Dim dbString As String

```

```

    lcb_IsItself = False

    If newChildRec.GetField("objid") =
5  newParentRec.GetField("objid") Then

        Set LCB_IN_SAME_ROLLUP_ERR = New GlobalString
        If App.GetString(LCB_STR_SAME_ROLLUP_ERR, dbString,
10  newChildRec.GetField("location_name")) Then
            LCB_IN_SAME_ROLLUP_ERR.SetValue dbString
        Else
            dbString = newChildRec.GetField("location_name") & "
            is already in this location rollup, please select another
            location."
15  LCB_IN_SAME_ROLLUP_ERR.SetValue dbString
        End If
        App.Msgbox LCB_IN_SAME_ROLLUP_ERR

        lcb_IsItself = True
20  End If

    End Function

    Function lcb_IsChild ( pList As List, newChildRec As Record ) As
25  Boolean

        Dim ind As Integer, MyList As List, dbString As String

        lcb_IsChild = False
30  ind = pList.FindFirstIndex( newChildRec.GetField("objid"),
        "child_objid" )

        If Not ind = -1 Then
35  Set LCB_CHILD_ROLLUP_ERR = New GlobalString
            If App.GetString(LCB_STR_CHILD_ROLLUP_ERR, dbString,
            newChildRec.GetField("location_name")) Then
                LCB_CHILD_ROLLUP_ERR.SetValue dbString
40  Else
                dbString = newChildRec.GetField("location_name") + "
                is already a direct or indirect child location, please select
                others. "
                LCB_CHILD_ROLLUP_ERR.SetValue dbString
45  End If
                App.Msgbox LCB_CHILD_ROLLUP_ERR

                lcb_IsChild = True
                Exit Function
50  End If

    End Function

    Function lcb_IsParent ( pList As List, newParentRec As Record )
55  As Boolean

        Dim ind As Integer, MyList As List, message As String
        Dim dbString As String
60  lcb_IsParent = False

```

```

ind = pList.FindFirstIndex( newParentRec.GetField("objid"),
"parent_objid" )

5   If Not ind = -1 Then

        Set LCB_PARENT_ROLLUP_ERR = New GlobalString
        If App.GetString(LCB_STR_PAR_ROLLUP_ERR, dbString,
newParentRec.GetField("location_name")) Then
10         LCB_PARENT_ROLLUP_ERR.SetValue dbString
        Else
            dbString = newParentRec.GetField("location_name") + "
is already a direct or indirect parent location, please select
others. "
15         LCB_PARENT_ROLLUP_ERR.SetValue dbString
        End If
        App.Msgbox LCB_PARENT_ROLLUP_ERR

        lcb_IsParent = True
20     Exit Function
    End If

End Function

25 Function lcb_IsSomeWhereInRollup ( newChildRec As Record ) As
Boolean

    Dim dbString          As String
    Dim ind                As Long
30

    lcb_IsSomeWhereInRollup = False
    ind = -1

    ind = invRollupList.FindFirstIndex(
35 newChildRec.GetField("objid"), "child_objid" )

    If ind > -1 Then

        Set LCB_IN_SAME_ROLLUP_ERR = New GlobalString
40     If App.GetString(LCB_STR_SAME_ROLLUP_ERR, dbString,
newChildRec.GetField("location_name")) Then
            LCB_IN_SAME_ROLLUP_ERR.SetValue dbString
        Else
            dbString = newChildRec.GetField("location_name") & "
45 is already in this location rollup, please select another
location."
            LCB_IN_SAME_ROLLUP_ERR.SetValue dbString
        End If
        App.Msgbox LCB_IN_SAME_ROLLUP_ERR
50

        lcb_IsSomeWhereInRollup = True
    End If

End Function

55 Function lcb_InOtherInventoryRollup (newChildRec As Record,
rollupRec As Record) As Boolean

    Dim dbString          As String
60    Dim ind                As Long
    Dim rollupItemRec     As Record

```

```

    lcb_InOtherInventoryRollup = False

    ind = -1
5    ind = otherInvRollupParentList.FindFirstIndex(
    newChildRec.GetField("objid"), "parent_objid" )

    If ind > -1 Then
        Set rollupItemRec =
10    otherInvRollupParentList.ItemByIndex(ind)

        Set LCB_INV_TYPE_ROLLUP_ERR = New GlobalString
        If App.GetString(LCB_STR_INV_ROLLUP_ERR, dbString,
    newChildRec.GetField("location_name")) Then
15        LCB_INV_TYPE_ROLLUP_ERR.SetValue dbString
        Else
            dbString = newChildRec.GetField("location_name") & "
    is already in Inventory Rollup " &
    rollupItemRec.GetField("rollup_name")
20        LCB_INV_TYPE_ROLLUP_ERR.SetValue dbString
        End If
        App.Msgbox LCB_INV_TYPE_ROLLUP_ERR

        lcb_InOtherInventoryRollup = True
25    Exit Function
    End If

    ind = -1
    ind = otherInvRollupChildList.FindFirstIndex(
30    newChildRec.GetField("objid"), "child_objid" )

    If ind > -1 Then
        Set rollupItemRec =
    otherInvRollupChildList.ItemByIndex(ind)
35

        Set LCB_INV_TYPE_ROLLUP_ERR = New GlobalString
        If App.GetString(LCB_STR_INV_ROLLUP_ERR, dbString,
    newChildRec.GetField("location_name")) Then
            LCB_INV_TYPE_ROLLUP_ERR.SetValue dbString
40        Else
            dbString = newChildRec.GetField("location_name") & "
    is already in Inventory Rollup " &
    rollupItemRec.GetField("rollup_name")
            LCB_INV_TYPE_ROLLUP_ERR.SetValue dbString
45        End If
        App.Msgbox LCB_INV_TYPE_ROLLUP_ERR

        lcb_InOtherInventoryRollup = True
    End If
50

End Function

Sub lcb_AddRolItm ( newParentRec As Record, newChildRec As
Record, rollupRec As Record, parentDepth as Long )
55

    Dim Bulks As New BulkSave, i As Integer, j As Integer,
    currParent As Record, currChild As Record, pObjid As Long,
    cObjid As Long
    For i = 0 To gparentPList.Count
60
        If i = gparentPList.Count Then

```

```

    pObjid = newParentRec.GetField ( "objid" )
Else
    Set currParent = gparentPList.ItemByIndex (i)
    pObjid = currParent.GetField ( "parent_objid" )
5   End If
    For j = 0 To gchildCList.Count
        If j = gchildCList.Count Then
            cObjid = newChildRec.GetField ( "objid" )
        Else
10         Set currChild = gchildCList.ItemByIndex (j)
            cObjid = currChild.GetField ( "child_objid" )
        End If
        Dim newRoleRec As New Record
        newRoleRec.RecordType = "loc_rol_itm"
15         If i = gparentPList.Count And j = gchildCList.Count
            Then
                newRoleRec.SetField "path_type", 0
                newRoleRec.SetField "depth", parentDepth + 1
            Else
20                 newRoleRec.SetField "path_type", 1
            End If
            BulkS.InsertRecord newRoleRec
            BulkS.RelateRecordsToID newRoleRec, "inv_locatn",
pObjid, "parent2inv_locatn"
25             BulkS.RelateRecordsToID newRoleRec, "inv_locatn",
cObjid, "child2inv_locatn"
            BulkS.RelateRecords newRoleRec, rollupRec,
"loc_itm2rollup"
            Next j
30         Next i

        BulkS.Save

    End Sub
35   Sub lcb_ValidateParent ( currParent As Record, rollupRec As
Record, currParentLocRec As Record )

    Dim MyBulkR                As New BulkRetrieve
40    Dim currParentlocList     As List

    Set otherInvRollupParentList = New List
    Set otherInvRollupChildList = New List
    otherInvRollupParentList.ItemType = "record"
45    otherInvRollupChildList.ItemType = "record"

    MyBulkR.SimpleQuery 0, "loc_rollup_v"
    MyBulkR.AppendFilter 0, "child_objid", cbEqual,
currParent.GetField("loc_objid")
50    MyBulkR.AppendFilter 0, "usage_type", cbEqual, 0
    MyBulkR.AppendFilter 0, "path_type", cbEqual, 0
    MyBulkR.AppendFilter 0, "rollup_objid", cbNotEqual,
rollupRec.GetField("objid")

55    MyBulkR.SimpleQuery 1, "loc_rollup_v"
    MyBulkR.AppendFilter 1, "parent_objid", cbEqual,
currParent.GetField("loc_objid")
    MyBulkR.AppendFilter 1, "usage_type", cbEqual, 0
    MyBulkR.AppendFilter 1, "path_type", cbEqual, 0
60    MyBulkR.AppendFilter 1, "rollup_objid", cbNotEqual,
rollupRec.GetField("objid")

```

```

MyBulkR.SimpleQuery 2, "inv_locatn"
MyBulkR.AppendFilter 2, "objid", cbEqual,
currParent.GetField("loc_objid")
5      MyBulkR.RetrieveRecords

Set otherInvRollupChildList = MyBulkR.GetRecordList(0)
Set otherInvRollupParentList = MyBulkR.GetRecordList(1)
10     Set currParentLocList = MyBulkR.GetRecordList(2)
        If currParentLocList.Count = 1 Then
            Set currParentLocRec = currParentLocList.ItemByIndex(0)
        End If

15 End Sub

Sub lcb_GetDataToValidateAdd ( viewName As String, currParent As
Record, currChild As Record, rollupRec As Record )
20
    Dim mychildCList As New List, mychildPList As New List,
    myparentCList As New List, myparentPList As New List
    Dim rollup_objid As Long, rollup_type As Long
    Dim MyBulkR As New BulkRetrieve
25
    Set invRollupList = New List
    invRollupList.ItemType = "record"

    Set otherInvRollupParentList = New List
    Set otherInvRollupChildList = New List
    otherInvRollupParentList.ItemType = "record"
    otherInvRollupChildList.ItemType = "record"

30
    mychildCList.ItemType = "record"
    mychildPList.ItemType = "record"
    myparentCList.ItemType = "record"
    myparentPList.ItemType = "record"
    Set gchildCList = mychildCList
    Set gchildPList = mychildPList
    Set gparentCList = myparentCList
    Set gparentPList = myparentPList
    MyBulkR.SimpleQuery 0, "loc_rollup_v"
    MyBulkR.AppendFilter 0, "parent_objid", cbEqual,
currChild.GetField( "objid" )
45     MyBulkR.AppendFilter 0, "rollup_objid", cbEqual,
rollupRec.GetField( "objid" )
        MyBulkR.SimpleQuery 1, "loc_rollup_v"
        MyBulkR.AppendFilter 1, "child_objid", cbEqual,
currChild.GetField( "objid" )
50     MyBulkR.AppendFilter 1, "rollup_objid", cbEqual,
rollupRec.GetField( "objid" )
        MyBulkR.SimpleQuery 2, "loc_rollup_v"
        MyBulkR.AppendFilter 2, "parent_objid", cbEqual,
currParent.GetField("objid")
55     MyBulkR.AppendFilter 2, "rollup_objid", cbEqual,
rollupRec.GetField("objid")
        MyBulkR.SimpleQuery 3, "loc_rollup_v"
        MyBulkR.AppendFilter 3, "child_objid", cbEqual,
currParent.GetField("objid")
60     MyBulkR.AppendFilter 3, "rollup_objid", cbEqual,
rollupRec.GetField("objid")

```

```

MyBulkR.AppendFilter 3, "depth", cbNotEqual, 0

MyBulkR.SimpleQuery 4, "loc_rollup_v"
MyBulkR.AppendFilter 4, "child_objid", cbEqual,
5 currChild.GetField("objid")

MyBulkR.AppendFilter 4, "rollup_objid", cbEqual,
rollupRec.GetField("objid")
MyBulkR.AppendFilter 4, "path_type", cbEqual, 0
10

MyBulkR.SimpleQuery 5, "loc_rollup_v"
MyBulkR.AppendFilter 5, "child_objid", cbEqual,
currChild.GetField("objid")
MyBulkR.AppendFilter 5, "usage_type", cbEqual, 0
15 MyBulkR.AppendFilter 5, "path_type", cbEqual, 0
MyBulkR.AppendFilter 5, "rollup_objid", cbNotEqual,
rollupRec.GetField("objid")

MyBulkR.SimpleQuery 6, "loc_rollup_v"
20 MyBulkR.AppendFilter 6, "parent_objid", cbEqual,
currChild.GetField("objid")
MyBulkR.AppendFilter 6, "usage_type", cbEqual, 0
MyBulkR.AppendFilter 6, "path_type", cbEqual, 0
MyBulkR.AppendFilter 6, "rollup_objid", cbNotEqual,
25 rollupRec.GetField("objid")

MyBulkR.RetrieveRecords

Set mychildCList = MyBulkR.GetRecordList(0)
30 If mychildCList.Count > 0 Then Set gchildCList = mychildCList

Set mychildPList = MyBulkR.GetRecordList(1)
If mychildPList.Count > 0 Then Set gchildPList = mychildPList

35 Set myparentCList = MyBulkR.GetRecordList(2)
If myparentCList.Count > 0 Then Set gparentCList =
myparentCList

Set myparentPList = MyBulkR.GetRecordList(3)
40 If myparentPList.Count > 0 Then Set gparentPList =
myparentPList

Set invRollupList = MyBulkR.GetRecordList(4)
Set otherInvRollupChildList = MyBulkR.GetRecordList(5)
45 Set otherInvRollupParentList = MyBulkR.GetRecordList(6)

End Sub

Function lcb_MeetAllRollupConditions ( rollupView As String,
50 newParentRec As Record, newChildRec As Record, rollupRec As
Record ) As Boolean

lcb_MeetAllRollupConditions = False

55 If lcb_IsItself ( newParentRec, newChildRec) Then Exit
Function

Call lcb_GetDataToValidateAdd ( rollupView, newParentRec,
newChildRec, rollupRec )
60

If rollupRec.GetField("use_type") = 0 Then

```

```

        If lcb_InOtherInventoryRollup (newChildRec, rollupRec)
Then
        Exit Function
        End If
5      End If

        If lcb_IsChild ( gparentCList, newChildRec) Then Exit
Function 'is it a child of node

10      If lcb_IsParent ( gparentPList, newChildRec) Then Exit
Function 'is it a child of node's parent(grandparents)

        'If we made it this far, then we know the new Child location is
not a direct or indirect link in either the focus location's
15      'child list or parent list. We also no it's not in some other
Inventory Rollup.
        'Need to check if this new child location exists in some other
branch
        'of this rollup hierarchy now.
20      If lcb_IsSomeWhereInRollup ( newChildRec ) Then Exit Function

        lcb_MeetAllRollupConditions = True

25      End Function

```

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